What is claimed is:

1. A method for measuring elastic characteristics of a medium, comprising the steps of:

applying vibrations to the medium;

acquiring an N number of ultrasound image frames of the medium;

estimating a variation in brightness of a speckle pattern over the N number of ultrasound image frames; and

measuring the elastic characteristics of the medium based on the estimated brightness variation.

2. The method according to claim 1, wherein the step of estimating further comprises calculating an average brightness and variance in brightness for every pixel over the N number of ultrasound image frames, wherein the average brightness and variance in brightness are calculated by the following equations:

$$m_N(i,j) = m_{N-1}(i,j) + \frac{1}{N}[x_N(i,j) - m_{N-1}(i,j)]$$

$$\sigma_N^2(i,j) = \sigma_{N-1}^2(i,j) + m_{N-1}^2(i,j) + \frac{1}{N}[x_N^2(i,j) - Nm_N^2(i,j) - \sigma_{N-1}^2(i,j) - m_{N-1}^2(i,j)]$$

where N is a current frame number, N-1 is a previous frame number, $X_N(i, j)$ represents a brightness value of the $(i, j)^{th}$ pixel in the n^{th} frame, $m_N(i, j)$ and $m_{N-1}(i, j)$ represent an average brightness for the $(i, j)^{th}$ pixel over the N number of frames as counted from the first frame and an average brightness for the $(i, j)^{th}$ pixel over the N-1 number of frames as counted from the first frame, respectively, and $\sigma_N^2(i,j)$ and $\sigma_{N-1}^2(i,j)$

represent a variance in brightness for the $(i, j)^{th}$ pixel over the N number of frames as counted from the first frame and a variance in brightness for the $(i, j)^{th}$ pixel over the N-1 number of frames as counted from the first frame, respectively.

3. The method according to claim 2, wherein a first frame delay element is used for storing the average brightness taken up to the $(N-1)^{th}$ frame, $m_{N-1}(i, j)$, and a second frame delay element is used for storing the variance in brightness taken up to the $(N-1)^{th}$ frame, $\sigma^2_{N-1}(i, j)$.

4. The method according to claim 1, wherein the step of estimating includes finding maximum and minimum values of brightness for each pixel over the N number of ultrasound image frames and calculating an absolute difference value between the maximum and minimum values.

5. The method according to claim 2, wherein the average brightness and the variance in brightness are calculated by recursion.

6. An apparatus for measuring elastic characteristics of a medium, comprising:

a vibrator for applying vibrations to the medium;

transducers for acquiring an N number of ultrasound image frames of the medium;

means for estimating a variation in brightness of a speckle pattern over the N number of ultrasound image frames; and

means for measuring the elastic characteristics of the medium based on the estimated brightness variation.

7. The apparatus according to claim 6, wherein the means for estimating calculates an average brightness and variance in brightness for every pixel over the N number of ultrasound image frames by using the following Equations:

$$m_N(i,j) = m_{N-1}(i,j) + \frac{1}{N}[x_N(i,j) - m_{N-1}(i,j)]$$

$$\sigma_N^2(i,j) = \sigma_{N-1}^2(i,j) + m_{N-1}^2(i,j) + \frac{1}{N}[x_N^2(i,j) - Nm_N^2(i,j) - \sigma_{N-1}^2(i,j) - m_{N-1}^2(i,j)]$$

where N is a current frame number, N-1 is a previous frame number, $X_N(i, j)$ represents a brightness value of the $(i, j)^{th}$ pixel in the n^{th} frame, $m_N(i, j)$ and $m_{N-1}(i, j)$ represent an average brightness for the $(i, j)^{th}$ pixel over the N number of frames as counted from the first frame and an average brightness for the $(i, j)^{th}$ pixel over the N-1 number of frames as counted from the first frame, respectively, and $\sigma_N^2(i,j)$ and $\sigma_{N-1}^2(i,j)$ represent a variance in brightness for the $(i, j)^{th}$ pixel over the N number of frames as counted from the first frame and a variance in brightness for the $(i, j)^{th}$ pixel over the N-1 number of frames as counted from the first frame, respectively.

8. The apparatus according to claim 7, wherein the means for estimating further comprises first and second frame delay elements, the first frame delay element storing the average brightness taken up to the $(N-1)^{th}$ frame, $m_{N-1}(i, j)$, and the second frame delay element storing the variance in brightness taken up to the $(N-1)^{th}$ frame, $\sigma_{N-1}^2(i,j)$.

9. The apparatus according to claim 6, wherein the means for estimating finds maximum and minimum values of brightness for each pixel over the N number of

ultrasound image frames and calculates an absolute difference value between the maximum and minimum values.

10. The apparatus according to claim 7, wherein the means for estimating calculates the average brightness and the variance in brightness by recursion.